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AUTHOR Osborne, Michael; Woodrow, Maggie
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ABSTRACT

Research was conducted to investigate the curriculum implications of the development of Access courses in mathematics, science, and technology in Great Britain; to identify problem areas; to provide examples of appropriate teaching/learning strategies; and to indicate effective staff development approaches. (Access courses are an alternative form of entry into higher education for adult students.) A two-phase research design (1) determined the national provision of Access courses as derived from current data and original research; and (2) investigated specific Access courses in mathematics, science, and technology using questionnaires, general information, and case studies. The study found 30 mathematics, science, and technology Access courses, which tended to fall between entry-level and higher education. All 30 courses have links with institutions of higher education, but the degree of collaboration is variable. The content of the courses varied with the provider. The content in all courses was influenced by the content of one or more types of existing syllabi, such as standard entry programs, syllabi of linked higher education courses, and of other established Access programs. Students were selected using tests and interviews. The study recommended that the Access curriculum should be developed and reviewed cooperatively by further education and higher education staff and that formal review of students' progress be made. Recommendations also were made concerning course content, assessment, validation, progression, targeting, and student support. (KC)

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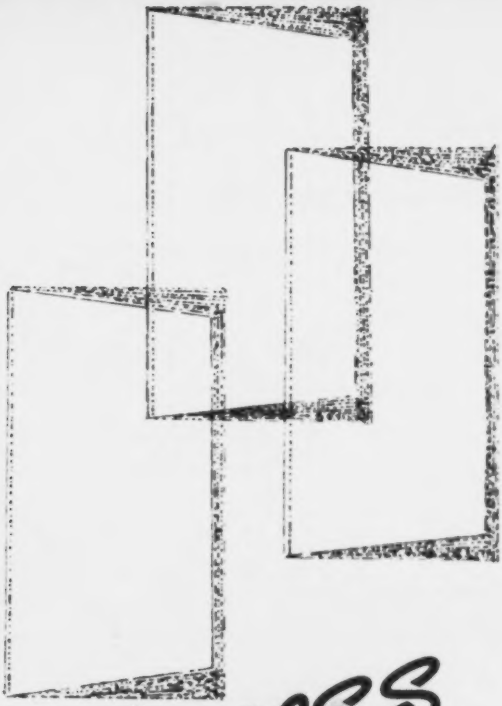

Access

TO MATHEMATICS SCIENCE AND TECHNOLOGY

Michael Osborne
and
Maggie Woodrow

FURTHER EDUCATION UNIT

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The project team wishes to acknowledge its debt to all those Access staff in further and higher education institutions who have contributed the raw material of this project by responding to the national questionnaire, and especially to staff in the 15 institutions involved in the seven case studies. Full versions of the case studies are available from the Department of Access Studies at the Polytechnic of the South Bank, Manor House Site, 58 Clapham Common, North Side, London SW4.

FOREWORD

The success of Access courses in facilitating entry to higher education for non-traditional groups has been considerable, especially over the past two or three years. The evidence from this project, with 50% of the students from ethnic minorities, 50% from the ranks of the unemployed and 40% women, shows that this is true of Access courses in maths, science or technology, although these are still something of a rarity. Whereas Access courses in the arts or social sciences have been established long enough for some effective long-term monitoring to have taken place, in science subjects they are still at an experimental stage and important questions remain unanswered. It is these questions that this project (RP337) seeks to address for the first time.

Against an overall national picture of science Access courses, it looks in depth at seven quite different Access course developments. For these it provides a detailed breakdown of all aspects of the Access curriculum.

Some of the findings here are reassuring; others may be seen as cause for concern. Student views of their curriculum were strongly favourable, with 75–90% expressing satisfaction with the maths and science elements of their curriculum. Progression figures indicate that six out of ten science Access students succeed in progressing to higher education courses. A close correlation emerges between the strength of the individual FE/HE Access link and student progression rates, with a lower pattern of success where these links are weak.

It is clear, however, that science Access courses, unlike those in other disciplines, have not been particularly distinguished by the innovatory aspects of their curriculum. In the balance between skills and knowledge content, between student-centred and discipline-based approaches, the weighting has generally been towards the latter. An unwillingness to experiment has perhaps been inevitable in discipline areas where the necessity for a groundwork of sequentially acquired knowledge has been rarely challenged, but perhaps it reflects also some reluctance on the part of HE staff to respond to newer approaches to learning. The chapter on students' views of their courses is useful reading for FE and HE staff.

At present, as this project indicates, higher education and the content of conventional entry qualifications such as 'A' levels, continue to exert the strongest influence on the science Access curriculum. In the longer term, the potential exists for this process to be reversed and for innovation to

travel though the Access route to the curriculum content and delivery methods of HE courses. Already, as the number of Access courses in maths, science and technology increases rapidly, the question is how, rather than whether, Access students can succeed. This project provides some initial answers; a new project – 'Challenging the HE Curriculum: Access Students in Higher Education' (RP499) – will provide further stimulus for curriculum change.

Dennis Drysdale
Deputy Chief Officer
Further Education Unit

1. BACKGROUND TO THE PROJECT

Aims

The aims of the project were:

- to investigate the curriculum implications of the development of Access courses in maths, science and technology;
- to identify problem areas;
- to provide examples of appropriate teaching/learning strategies;
- to indicate effective staff development approaches.

Research timetable

Research took place in two phases. A preliminary stage was designed to determine the national provision of Access courses in maths, science and technology as derived from current data and original research, and to establish from current literature the most recent trends in education in science and technology. This national survey was used to identify a range of questions to be addressed within the main stage.

The main stage took the form of a detailed investigation of specific Access courses in maths, science and technology. For this stage, a disciplinary approach was adopted, with a focus on maths and selected subjects in pure and applied science and technology. This approach was designed to enable comparisons to be made between the curriculum offer of Access syllabuses in these areas and the curriculum of traditional modes of entry to higher education (HE). Issues raised here include the nature of particular subject cultures in the sciences and their influence on access to HE, curriculum content and delivery and, in particular, the balance between skills and knowledge in Access courses in maths, science and technology.

The procedures and criteria for selecting students for science Access courses are examined, and the strengths and weaknesses of Access students and Access courses in these disciplines are discussed.

Methodology: the national survey

Literature search

In the preliminary stage of the project, literature documenting existing Access courses was collected. The major sources identified were the Council

for National Academic Awards (CNAA) survey[1] and the Lucas and Ward work[2]. The literature search also covered other published works relating to both Access and recent developments in science education in the further education (FE) and HE sectors.

National questionnaire

For the national survey, initial questionnaires with a covering letter explaining the aims of the project were sent to:

- principals/directors of all FE, FHE and HE colleges;
- directors of all polytechnics;
- academic registrars of all universities.

The questionnaire asked whether the institution was involved in or planning any Access courses in maths, science or technology, or received or planned to receive students from such courses. In cases where any of these answers were positive, course proposals, detailed syllabuses and names of contact persons were requested.

A second simple questionnaire was sent to positive respondents where their initial information was incomplete, or where they had indicated that further developments might occur during the period of the project. In the latter part of the project further details of various courses or plans were elicited by telephone.

General information

General information about Access developments was sought from organisations with an active interest in this area. These included Open College networks, the Centre for Access Studies at Roehampton Institute and the Forum for Access Studies.

Unpublished documents, particularly those of the Inner London Education Authority (ILEA), were obtained through the attendance of the project workers at internal seminars and conferences. Other documents were sent to the project as a result of personal contacts made during the course of the project.

Information for the preliminary stage was mainly collected from January to April 1986, though additional material was gathered until March 1987.

Methodology: the case studies

All existing Access courses in maths, science and technology in England and Wales were considered for detailed study. Using information gathered in the preliminary phase of the project, seven case studies were selected to provide a variety of courses in terms of:

- geographical location;
- mode of student attendance;
- curriculum approach;
- mode of assessment;
- nature of HE exit;
- number of HE exits.

Information about these seven case studies was sought from six target groups:

- Access course organisers/course tutors;
- lecturers on Access courses;
- Access link persons in HE;
- HE course directors;
- Access students;
- former Access students in HE.

Permission for the study of these courses and their linked HE exits was obtained from principals and directors of appropriate institutions.

In the first instance, the following written documentation was collected from Access course tutors and HE course directors:

- initial course proposals and detailed syllabuses of Access courses;
- detailed syllabuses of linked HE courses;
- LEA documentation relating to the Access courses.

At the same time, relevant syllabuses of GCE advanced level subjects and ordinary level BTEC units were collected from the appropriate boards.

Interview schedules and questionnaires

Interview schedules for use in FE and HE were drawn up after the identification of curriculum issues from the work of the preliminary stage.

Interviews with FE and HE staff were normally carried out on a one-to-one basis, for periods of one to two hours. In some cases, however, information was gathered from small group sessions.

Student questionnaires for use with Access students and Access entrants now on HE courses were drawn up after the preliminary work. These questionnaires were piloted on a trial group of Access students and subsequently adapted for further use.

Questionnaires were given out with, where possible, a personal explanation of their purpose by the project workers. Otherwise they were distributed via the Access course tutor or HE link person. All student questionnaires were completed anonymously.

This main stage was undertaken from April to December 1986.

2. THE NATIONAL PICTURE

The nature of Access courses

This report investigates the curriculum implications of Access courses in mathematics, science and technology. The use of the term 'Access courses' has been the subject of some debate. It has been suggested that 'Access courses fall along a continuum of provision for adults – from basic skills at one extreme to HE entry at the other'[3]. The 1987 White Paper, *Higher Education: Meeting the Challenge*,[4] distinguishes between three recognised routes to higher education – traditional sixth form qualifications, vocational qualifications and Access courses. In line with these distinctions, the project does not include courses designed to prepare mature students for 'A' level or BTEC qualifications.

A more specific definition provided in the FEU's discussion document, *Access to Further and Higher Education*[5], states that the 'basic characteristics of Access courses are negotiated and guaranteed progression procedures on to specified courses at particular HE institutions, validation of courses by those HE institutions, and HE staff involvement in the teaching of Access courses'.

This definition is consistent with that used by other organisations. For instance, the Forum for Access Studies (FAST), a national body established to represent and promote Access studies into higher education, defines Access as 'an alternative entry into a range of higher education opportunities for mature students', which involves 'collaboration between adult, further and higher education'.[6]

The use of the term 'Access courses' to imply alternatives leading to HE entry for adults has been chronicled by Woodrow[7]; it is with such courses that this report is concerned. However, the project is not limited to 'special Access', a term used in the DES circular of 1978 which invited local authorities to develop alternative routes to HE, particularly (though not exclusively) for members of ethnic minority groups[8]. Although a number of courses are restricted to particular ethnic minority groups, these are outnumbered by the provision of many more Access courses without this entry criterion. Nonetheless, most courses include an element of targeting and are oriented towards students who have not fully benefited from the education system, whether for reasons of class, gender or ethnic origin.

The FEU discussion document emphasises the importance of collaboration in Access arrangements, explaining that the 'tried and tested method is the

validation of the course by the HE institution(s) concerned, with a guaranteed place on successful completion of the Access course'. This applies to a substantial portion of Access provision, but the degree of partnership is variable and successful completion of an Access course does not always lead to guaranteed places in HE. Elsewhere, the Access qualification is sometimes used more as a negotiating tool for entry to a non-specified course. This project has used the FEU definition as a benchmark but has included both structured models of Access and those with 'loose' and informal or insubstantial HE relationships.

A distinctive feature of the Access curriculum is its concentration on developing the skills needed by students to perform effectively within HE rather than on the conventional knowledge-based approach. Courses have tended to be student-centred while anticipating the subject-centred provision of much of the HE curriculum.

Access developments in science, maths and technology

In the DES circular of 1978 it was envisaged that Access courses would primarily meet a need to provide more teachers but, even at the time, it was considered 'important that they should prepare the student for entry to higher education and professional training more generally'. Although, initially, Access to B.Ed. was predominant, this mechanism of entry to HE was expanded to include the caring professions, the humanities and the social sciences during the period up to 1983.

Apart from the Access course in science at Southwark College which started in 1979, and the 'A' level alternative course at Shirecliffe College initiated in 1981, the main Access course developments in maths, science and technology took place in 1983-4 when eight new courses were developed and the Southwark course was expanded considerably. These courses covered a range of maths, science and technology disciplines and are variously described as maths and science, computing, electrical and electronic engineering, food studies, and built environment Access courses.

These titles reflect a change from Access to maths and pure science degrees to the development of links with vocationally oriented HE courses. Most of these Access courses are full-time, with discretionary awards available to students. The South Thames B.Ed. Access course (primary science) developed in 1984 was the first science Access within the 21-hour part-time mode and covers a period of four terms.

The early science Access provision was single-exit and linked to degree

courses: some of the courses in the later phase were multi-exit and linked to higher diplomas as well as degrees. No science Access course was restricted to particular ethnic minority groups although the London-based courses were required to comply with the ILEA definitions of 'disadvantage' in the selection of students. The City and East London College course, linked to the modular science degree/diploma scheme at City of London Polytechnic, was the first science Access course to be targeted specifically at women.

Results of the literature survey

The published literature specifically pertaining to Access courses is not extensive and that concerned with Access to maths, science and technology represents a small fraction of this. However, some reference to science Access has been made in more general literature and details can be obtained from unpublished sources.

Non-standard entry

Access students have historically been categorised among the 'non-standard' entrants to HE, i.e. those without the normal minimum entry qualification for admission to a first degree or diploma HE course (see Regulation 8.13 of the CNAA's Principles and Regulations[9]. Evans' survey[10] found that, in 1980/81, non-standard entrants comprised 4.5% of total admissions to CNAA degrees. Bourner's more recent research indicates that 11.5% fall within non-standard entry categories[11]. His analysis of these students demonstrates that, in terms of degree performance, they 'fare no worse than the other groups of entrants' and that 'when entry qualifications of a similar level are grouped together . . . the non-standard entrants, on average, fare rather better than the other groups'.

General literature on Access

The most comprehensive national overview of the nature of Access provision is contained in the Millins DES evaluation project which monitored selected Access courses during the period 1979 1983[12]. A follow-up study of Access students included in that project has been undertaken by Davies and Yates at the Centre for Access Studies, Roehampton Institute, funded by the Nuffield Foundation during the period 1984–6[13]. The only national surveys of Access provision are those published by the CNAA in 1984[1] and the University of Lancaster in 1985[2].

A number of articles on Access issues have been published by the Centre for Access Studies in its journal *Access to Higher Education Forum*[14]. Recent seminars and conferences have generated further literature – the joint National Association of Teachers in Further and Higher Education

(NATFHE)/*Times Higher Education Supplement* (THES) seminar, 'Access and Quality', held in November 1985 and the follow-up conference of the same name held in May 1986 have produced a number of articles which have been published in the first two numbers of the *Journal of Access Studies*[6,15]. This journal, published by FAST, is a reflection of increased interest in Access studies.

Most other sources are short articles arguing the pedagogic philosophy underlining Access courses. These may be found in publications such as the THES and the NATFHE journal. There are a few relevant research papers, a rare example being Connolly's work of 1984 5 and 1985 which present a detailed comparison of the achievements of Access and non-Access students on a B.Ed. course[16,17].

References to Access in national documents

There are references to Access courses in DES publications, including the reports of the Swann Committee[18] and the Lindop Committee[19], and the Green Paper *The Development of Higher Education into the 1990s*[20]. The National Advisory Body (NAB) on public sector education also makes reference to Access in the report of its Continuing Education Group[21] and in its *Strategy for Higher Education in the Late 1980s and Beyond*[22]. These indicators of central policies have offered both encouraging and discouraging signals towards Access course developers.

The Further Education Unit (FEU), in addition to its discussion document, *Access to Further and Higher Education*, has responded to the Lindop Report which had questioned the acceptability of certain Access arrangements[23]. The CNAA has also commented on DES statements and clarified its policies with regard to the admission of Access students[24]. The most recent government statement, the White Paper *Higher Education – Meeting the Challenge*[4], offers the most encouragement, identifying Access courses as one of three 'generally recognised' routes into higher education. Of particular importance is the statement that the government 'sees no evidence in general that standards are impaired by the admission of students through this route; on the contrary, the context and delivery of HE courses which they attend can benefit from their presence'.

LEA and Open College publications

In 1982/3, the ILEA inspectorate concluded a major review of all its Access courses[25] and has subsequently held a number of internal seminars. The ILEA has also commissioned research reports, notably in relation to the recruitment of Asian women to Access courses[26].

Certain Open College networks have provided forums for the discussion of issues pertaining to Access courses. For instance, the Open College of South London (OCSL) Access Studies Panel meets three times a year to bring together Access staff and other interested parties and has published a number of occasional papers relating to Access. Open College networks have also been engaged in a number of Access research and action projects. The Central and West London Open College (CAWLOC) has produced *Barriers to Access*, a report which focuses on the experiences of mature students on a variety of adult courses, including Access courses, within its catchment area[27]. Access to Learning For Adults (ALFA), the North London Open College Network, is currently engaged in a CNAA-funded project to investigate and improve progression routes for adults who wish to enter HE[28].

The Open College of the North West offers stage B units which can be accumulated and used to negotiate entry to HE. These units are studied in a number of colleges within the federation and, in the case of physical sciences and mathematics, have also been developed for home study. The Manchester Open College Federation accredits level 4 units which are taught within its member institutions and can be used to negotiate entry to HE. Several of these units are in national and scientific disciplines.

Published materials for use in the teaching of Access students are rare. The notable exception is an Access study skills pack produced by the ILEA[29].

References to Maths, Science and Technology Access

The CNAA and Lucas and Ward surveys of Access courses indicate their relative scarcity in maths, science and technology by comparison with those in the humanities and social sciences. Other references to maths, science and technology in the aforementioned sources are rare, although NAB's *Strategy for Higher Education in the late 1980s and Beyond*[22] states that 'Access to courses should continue to be developed with the emphasis switching to the more difficult task of providing students with the attainments necessary to enter higher education in mathematical, scientific and technological subjects'.

The DES, in a recent statement, has noted the need for the development and dissemination of positive practice in this field and has raised the question whether the access mode as initially conceived is a suitable preparation for HE courses where a substantial body of specific and subsequently learnt knowledge and skills is required[30]. Reference to specific pedagogical issues pertaining to this type of Access can be found in the ILEA Inspectorate's review of Access courses[25]. This report notes that

'Access to science . . . which appeared to require a greater knowledge and understanding of facts, seemed to suggest that the curriculum would additionally have to provide specific subject studies to a standard approximating to 'A' level'. The authority's inspectorate sought 'to resolve the apparent conflict in philosophy and style, and in priorities', of these differing curriculum demands.

Parry has detailed the issues involved in negotiating an Access link in a science-based subject area in his account of the development of the Access course in food studies at South London College[31]. A major piece of research in the field of science Access has been undertaken by Singleton in ILEA's review of science Access courses[32]. In this work, curriculum issues in relation to eight science Access courses are discussed.

At present there are at least two further pieces of research taking place. South Bank Polytechnic is undertaking a major project, funded by the CNAA, focusing on HE involvement in Access courses in maths, science and technology. At the Central and West London Open College (CAWLOC), a development project 'aims to assess the demand for courses' in these disciplines by 'tapping the experience and records of education advisers and course tutors'[33].

3. THE NATIONAL SURVEY

Existing courses

The preliminary survey yielded 253 responses from FE and HE institutions in England and Wales. It has revealed 30 maths, science and technology Access courses, of which 13 are full-time and 17 part-time. Fifteen of the 30 are based in the ILEA and nine of these are full-time courses.

All 30 courses have links with HE institutions, but the degree of collaboration is variable. Successful completion of the Access course does not always guarantee entry to HE and the links are not always to specific courses. The courses within the Manchester Open College Federation (MOCF) and the Open College of the North West (OCNW) are not always complete Access programmes, but a collection of level 3 and 4 units within MOCF or stage 8 units within the OCNW can be used to negotiate entry into HE courses. In Table 1, OCNW subject units have been listed as courses. The Southwark Access courses which offer a range of subject combinations has been listed as three courses.

Table 1. The national survey
Existing science Access courses (to December 1986)

Course title	*FE college*	*Linked HE institution*	*Mode FT/PT*	*Year course started*	*Main subject areas*
Access to HE	Acton Technical College	Slough College of HE and Kingston Polytechnic	PT 1 year	1986	Physics, maths, computer science, electronics, communications
Electrical Electronic Engineering Access	Brixton College	South Bank Polytechnic (HND/HNC)	FT 1 year	1984	Maths, physical science, engineering science, microelectronics
Catalyst	City and East London College/Tower Hamlets AEI	City of London Polytechnic (modular degree)	PT 4 terms	1986	Life sciences, chemistry, physics, maths
Modular Degree Preparatory Course	City and East London College	City of London Polytechnic	PT 4 terms	1985	Earth sciences, biology, maths
Pre-degree Course	Cricklade College/ Highbury College of Technology	Portsmouth Polytechnic	PT 1 or 2 years	1986	Maths, environmental studies, science and technology

(contd)

Table 1 (contd)

Course title	*FE college*	*Linked HE institution*	*Mode FT/PT*	*Year course started*	*Main subject areas*
Maths and Science Access	Hackney College	City of London Polytechnic	PT 1 year	1986	Maths, physics, computing
Science for Engineering	Handsworth Technical College	Birmingham Polytechnic	PT 1 year	1986	Physics, maths
Access Course to BSc Science	Haringey College/ Tottenham College of Technology	North London Polytechnic (combined science BSc)	PT 1 year	1985–86	Biology, chemistry, maths, physics
Maths and Science Access	Kingsway-Princeton College	North London Polytechnic (BSc combined science)	PT 1 year	1983	Maths, physics, chemistry
Visa Programme Science Studies	Central Manchester	Manchester Polytechnic	FT 1 year	1985	
Gateway Programme	South Manchester Community College	Not specified	PT	1986	Physical science, environmental studies levels 3 and 4 MOCF
Open Course in Access Life Sciences	Mid-Warwickshire College of FE	Coventry Polytechnic (modular degree), Warwick University (BEd primary science)	FT 1 year	1985	Maths, biology, chemistry, geography
Alternative Access to HE in Science and Technology	Old Swan Technology College Liverpool	Liverpool Polytechnic	PT	1985	Maths, computing, chemistry, physics, biology
OCNW Units	Accrington and Rossendale College/ Blackburn College/Kirby College of FE/ Nelson and Colne College/ Runshaw Tertiary College/Wigan College of Technology/ W R Tuson College	Not specified	Stage B units		Electronics, maths, biology, physics
Access to Science	Paddington College	Polytechnic of Central London (BSc modular science)	FT 1 year	1983	Maths, physics, chemistry, biology

(contd)

Table 1 (contd)

Course title	*FE college*	*Linked HE institution*	*Mode FT/PT*	*Year course started*	*Main subject areas*
Access to Computing	Paddington College	Polytechnic of Central London (BSc/HND computer studies)	FT 1 year	1983	Maths, computing, electronics
Access to Engineering	Paddington College	Polytechnic of Central London (BEng/HND mechanical engineering)	FT 1 year	1985	Maths, engineering, computing and physics
'A' level Alternative	Shirecliffe College	Sheffield City Polytechnic	PT 1 year	1981	Maths, physics, chemistry, biology
Access Course in Engineering	South London College	South Bank Polytechnic (HND courses)	FT 1 year	1979	Maths, physics, engineering, science
Food Studies Access	South London College	South Bank Polytechnic and North London Polytechnic (BSc/ HND courses)	FT 1 year	1984	Maths, chemistry, biology, food science and physics
Health, Biology and the Environment Access	South London College	South Bank Polytechnic and Thames Polytechnic (BSc and HND courses)	PT 1 year	1986	Maths, chemistry, biology, health and environmental studies, physics
BEd Science Access	South Thames College	Kingston Polytechnic (BEd Science)	PT 4 terms	1984	Maths, general science, education studies, communications
Access to Maths, Science and Computing	Southwark College	City of London Polytechnic (modular degree)	FT or PT 1 year	1979	Maths and combinations of chemistry, computing, biology, electronics and physics
Access to the Built Environment	Vauxhall College of Building and FE	South Bank Polytechnic	FT 1 year	1983	Maths, physical sciences
Science and Engineering Access	Woolwich College	Thames Polytechnic (BSc engineering science, maths and computing)	FT 1 year	1983	Physics, maths, chemistry, biology

Planned courses

During the period of the preliminary survey (January – April 1986), 48 replies indicated that an Access course in maths, science and technology was being planned. However, the term 'planned' for respondents covered everything from a general desire to set up such a course sometime in the future to the development of a specific course linked to a particular HE course planned for a definite start date.

Some who planned to start in September 1986 have got off the ground and are included in Table 1. Information received relating to planned courses indicates a considerable increase in the development of Access to maths, science and technology and provides illustrations of a number of strategies being employed in order to offer such courses.

There is an increase in vocationally oriented rather than pure science outlets. Links with particular courses have been indicated by the courses in Brent, Goldsmiths, Haringey, Hillcroft, Lancashire, North Lindsey, Shirecliffe and Stannington and Willesden/Kilburn. Apart from the Goldsmiths course, all are linked to applied courses in HE. In the London borough of Brent, an Access course is being planned for the first time within the schools sector. This course, developed at South Kilburn Community School, aims to link with a number of HE institutions, though specific linked courses have not yet been negotiated.

Targeting

A few planned courses are targeted at women alone. These are the proposals from Haringey, Hillcroft and Lancashire. In each, the outlets include an aspect of engineering or electronics. One course being planned at Willesden College of Technology and Kilburn Polytechnic, linking with various courses in the department of biotechnology at South Bank Polytechnic, will be targeted towards Black people.

University involvement

Apart from the existing link between Mid-Warwickshire College of FE and Warwick University, this sector of HE has been absent in the past from Access in maths, science and technology. However, these findings indicate that the university sector is increasing its involvement. Respondents have indicated that Brunel, Essex, Kent and Surrey Universities, and Goldsmiths College and Imperial College of the University of London are taking part in planning linked courses.

In-house arrangements

Goldsmiths College is considering a course in maths as an internal feed to its mathematics degree schemes. Similar developments are planned elsewhere. At Lancashire Polytechnic, for example, a number of science degrees may be linked to the internal Access into science courses.

The proposed courses at Goldsmiths College and Lancashire Polytechnic appear to be a new development for HE institutions in that they are non-externally funded provision giving guaranteed entry to specific HE courses for successful students.

Conversion courses

The Polytechnic Certificate in Technology at Lancashire Polytechnic provides an example of a conversion course for women under EEC funding, where some 'unqualified' students may use the provision as an Access course (in the sense of the FEU definition). Similarly, in Sheffield, the consortium of Shirecliffe and Stanningham Colleges together with Sheffield Polytechnic has planned the conversion course in engineering and technology so that it can be offered with a complementary provision for unqualified mature entrants.

Table 2. The national survey: planned courses

Shows planned courses with specific start dates, but represents only a portion of the positive responses. Full details were not always available at the time of the questionnaire.

Course title	*FE college*	*Linked HE institution*	*Mode FT/PT*	*Start date*	*Main subject areas*
Access to Science	Brunel Technical College	Bristol Polytechnic (BSc/HND applied biology, HND applied physical science)	FT 20 hours	1987	Maths, physics, chemistry
Access to Science/ Technology	Chichester College of Technology	Surrey University	Under discussion, duration 1-1½ years	1987	Maths, physics, biological science
Essex Access Scheme	Chelmsford College of FE/ Southend College of Technology/ Braintree College of FE/ Thurrock Technical College/ Colchester Institute/ Loughton College of FE/ Harlow College	Essex Institute of HE, North East London Polytechnic, Essex University, Writtle Agricultural College		1987	Maths, science
Back to Maths	Goldsmiths College with local FE colleges	Goldsmiths College (BSc mathematical studies, BSc maths/ psychology)	PT	1988	Maths, physics
Pure Science	Handsworth Technical College	Warwick University	PT 4 terms	1988	All sciences

(contd)

Table 2 (contd)

Course title	*FE college*	*Linked HE institution*	*Mode FT/PT*	*Start date*	*Main subject areas*
HE Foundation Certificate	Hull College of FE	Humberside College of HE	PT	1988	Chemistry, biology, maths, physics
Women into Technology	Haringey College	North London Polytechnic (degree and diploma courses in science and technology, subjects including electronic and communication engineering)	PT/FT 1 year	1988	Electronics, computing, maths
CNAA Certificate Options for Women Only	Hillcroft College	South Bank Polytechnic (HNC)	PT	1988	Options in computing and maths
Access Computing Course	South Kilburn Community School	Middlesex Polytechnic, Ealing College of HE, North London Polytechnic	FT 1 year	1988	Maths, science, English language, computing
Polytechnic Certificate in Technology	Lancashire Polytechnic	Internal (mainly engineering courses)	FT 1 year	1988	Maths, electronics, mechanical engineering, computer studies
Access into Science	Lancashire Polytechnic together with local FE colleges	Lancashire Polytechnic (BSc applied biology/ astronomy)	1 year FT or PT	1988	Maths, chemistry, biology, physics
Access Course in Science	North West College of Technology, Londonderry	University of Ulster	PT 2 years	1987	Maths, physics, biology, chemistry
HE Foundation Certificate	North Lindsey College of Technology	Humberside College of HE	PT 1 year	1988	Food science, biology and scientific method studies
Access in Science and Engineering	Riversdale College of Technology	Liverpool Polytechnic	PT 1 year	1988	
Access into Maths, Computing and Science	Roehampton Institute of HE	Surrey University, Imperial College of Science and Technology		1989	Maths, physics, computing
Science Access	Consortium of colleges in Somerset	Bristol Polytechnic		1988	
Access to BEd Science	Southwark College	North London Polytechnic (BEd primary science)	FT	1987	Maths, general science, education studies

(contd)

Table 2 (contd)

Course title	*FE college*	*Linked HE institution*	*Mode FT/PT*	*Start date*	*Main subject areas*
Access Course in Science	South Warwickshire College of FE	Warwick University, Coventry Polytechnic	FT	1988	Mainly biology
Access Course in Combined Sciences and Computing	Stoke-on-Trent Technical College	North Staffordshire Polytechnic	PT 1 year	1988	Computing, engineering, maths and science
Access to Maths, Science and Computing	Shirecliffe College, Stannington College	Sheffield City Polytechnic (applied science programme)	1 year FT 4 terms	1988	Maths, engineering and sciences
Access to Science	Waltham Forest College	North East London Polytechnic	FT 1 year	1987	Biology, chemistry, physics
Science Access	West Cumbria College	Lancashire Polytechnic	PT 1 year	1988	Chemistry, physics, maths and computing
Access to Biotechnology	Willesden College of Technology, Kilburn Polytechnic	South Bank Polytechnic	FT 4 terms	1988	Biology, maths, chemistry
Access to Physical Science and Maths	Willesden College of Technology	South Bank Polytechnic (BSc HND in physical science and computing)	PT 4 terms	1988	Maths, physics, computing

FINDINGS FROM THE CASE STUDIES

On the basis of the information obtained in the national survey, a group of seven courses was selected for detailed investigation, using the criteria listed in Chapter 1, to give a broad cross-section of models in terms of geographical location, mode of attendance, curriculum approach, mode of assessment and nature of exit course. Where possible, the most well-established courses were chosen for investigation.

The following courses were studied:

Open Access Course in Life Sciences	Mid-Warwickshire College of FE
Access Course in Engineering	Paddington College
'A' level Alternative	Shirecliffe College
Access Course in Food Studies	South London College
Access Course in Science	Southwark College
Access Course to the Built Environment	Vauxhall College of Building and FE
Access Course in Science	Woolwich College

Detailed information about each of these courses is included in the full reports of the individual case studies, which are available from the department of Access studies at South Bank Polytechnic.

4. THE CONTENT OF SCIENCE ACCESS COURSES

This section of the report analyses the curriculum contents of the courses studied and compares them with each other and with courses leading to standard entry qualifications. The subjects offered in each course, together with the number of hours of weekly contact of the case study, are summarised in Table 3.

Table 3. Distribution of contact hours per week

	Maths	*Computing*	*Physics*	*Chemistry*	*Biology*	*Study skills*	*Others*	*Total contact hours*
Mid-Warwickshire	4.25	0	0	4	7.75	0	4[1]	20
Paddington	6	4	6	0	0	3	4[2]	23
Shirecliffe	NS	0	NS	3	NS	NS	NS[3]	20
South London[4]	4	1	2	6	4	3	4[5]	24
Southwark	6	0	0	7	7	0	2[6]	22
Vauxhall	7	0	0	0	0	8	13[7]	28
Woolwich	6/7[8]	1	6/7[8]	6/7[8]	6/7[8]	1	1[9]	22

NS = Non-Specified

Notes: [1]Geography, [2]Engineering, [3]Computing statistics, [4]Science route only given, [5]Food science, [6]Bilingual support, [7]Graphicacy and materials science, [8]three out of four of these subjects are studied, [9]one hour of chosen main subject.

Mathematics

Mathematics is the only subject common to all the courses studied. In three courses – Paddington, Vauxhall and Woolwich – it is a central core subject reflecting the fact that students are being prepared for HE courses in maths, engineering, building or the physical sciences. In other courses maths has a supporting role; here the exit links are largely biology or chemistry orientated or have no specific subject bias.

From Table 3 it is evident that where the Access course provides exits to maths, engineering, building or the physical sciences, six to eight hours of maths tuition is provided. Other courses provide four hours of maths.

A component of basic arithmetic is included within six of the courses, though at Woolwich this topic is covered in only six hours. At Paddington there is no specific arithmetic component. Little or no arithmetic input is reflected in the entry requirements for these linked HE courses.

In addition to the hours shown in Table 3, a number of courses provide specific tutorial support in maths. At Paddington, up to three extra maths workshops can be attended. This generous provision is a consequence of the fact that there are two other science Access courses at the college sharing this facility. Similarly, at South London College, the one hour of tutorial support in maths is shared with another science Access course.

A major input of algebra and graphs and a minor input of trigonometry and geometry is common to all courses. Calculus also appears mandatory, though it is clear that a more substantial coverage is provided where the course exits to maths, engineering, building or the physical sciences. Relatively small inputs of mensuration and series are found in a majority of courses. There is a small input of introductory statistics in three courses, but only in the Southwark course is there a major contribution from this subject which is the largest component. More specialist topics, namely complex numbers, matrices, vectors and linear programming, are found only in courses leading to maths, engineering, building and the physical sciences (at Paddington, Vauxhall and Woolwich).

Although the number of hours spent on a particular subject or topic is not necessarily a reflection of the level at which it is taught, it is clear that courses giving greater time to maths are able to pursue that subject to an academically higher standard. Paddington and Woolwich use standard qualifications as no more than a broad reference point, pursuing selected topics to a level approximately equivalent to that found in the core of an 'A' level in pure mathematics. Chosen topics are studied at the level found in a BTEC level 3 mathematics unit at Vauxhall. In other cases, the level of maths can be more usefully compared to that found in an 'O' level course, only a few topics being taken to a higher standard. The design process of these syllabuses and their relation to standard qualifications, if any, are discussed in Chapter 5. The number of hours ostensibly given to mathematics on the timetable should not be taken in all cases as the sole space for the input of this subject. Elsewhere on most courses, mathematical skills are developed in the context of other subjects.

Physics

Physics is a core subject in the Paddington, Shirecliffe and Woolwich courses; a high proportion of the materials science at Vauxhall is applied physics. At South London, physics is very much a support subject to the major sciences chemistry and biology. Table 4 outlines the major topics of physics studied in these courses.

Clearly, certain topics are common to all courses, namely thermal studies

and electricity and magnetism. The broadest and most in-depth coverage is provided in the Woolwich course where exits to degrees in physics, materials science and engineering are available. Consequently, in terms of content, this course most closely resembles a standard entry programme.

Table 4. Major topics studied in physics

	Thermal studies	*Waves optics*	*Forces statics*	*Mechanics*	*Electricity & magnetism*	*Electro-statics*	*Electronics*	*Radio-activity*
Paddington	x	–	x	x	x	x	x	–
Shirecliffe	x	x	–	x	x	x	–	x
South London	x	x	–	–	x	–	–	x
Vauxhall	x	x	x	x	x	x	x	x
Woolwich	x	x	x	x	x	x	x	x

Other topics Materials science (Paddington)
Materials in construction (Vauxhall)
Data analysis (Woolwich)

A more limited range of topics is covered in all other courses. This range appears, in the main, to be dictated by the nature of the exit courses. The courses at Paddington and Vauxhall, both linked to engineering and/or applied physical science courses, have a largely similar programme. However, while electrostatics and electronics are covered in the Paddington course, it is absent at Vauxhall. Conversely, waves/optics is included at Vauxhall but not at Paddington. At Vauxhall there is a major input of material on construction, reflecting the exits into building economics and building administration. On the Paddington College course there is a unit of materials science with specific reference to mechanical engineering applications.

At Shirecliffe there is considerable breadth but less depth of content than in any course, apart from that at South London. Within the food studies course, the very selective content of the physics programme is due to its role as a support subject for chemistry and the relatively lesser demand for previous knowledge in physics in the exit courses.

Chemistry

Chemistry is a core subject within the courses at Shirecliffe, South London, Southwark and Woolwich, while at Mid-Warwickshire it is secondary to biology. At Vauxhall there is a very small input of chemistry by way of background to the structure of materials. Table 5 outlines the major topics studied within these courses, Vauxhall excluded.

Table 5. Major topics studied in chemistry

	Mole concept	*Atoms & electronic structure*	*Bonding*	*Periodicity*	*Organic*	*Redox*	*Enthalpy*	*Kinetics*	*Equilibrium and ionic*
Mid-Warwickshire	x	x	x	–	–	–	–	–	–
Shirecliffe	x	x	x	x	–	x	–	–	x
South London	x	x	x	x	x	x	x	x	x
Southwark	x	x	x	x	x	x	x	x	x
Woolwich	x	x	x	x	x	x	x	x	x

Other Topics Solids and solutions (Shirecliffe)
Food and biological chemistry (South London)
Gaseous state (Southwark)
Classical inorganic chemistry, colloids (Woolwich)

There are considerable similarities between the contents of the courses at South London, Southwark and Woolwich where, in the topics covered, the level is generally comparable with that in 'A' level or BTEC programmes. At South London and Woolwich, however, there is greater emphasis on organic chemistry. In each case there is at least one topic unique to that course. In the South London course which has exits to HE courses in food science and nutrition, there is a substantial unit of food and biological chemistry. Southwark's chemistry programme is unique in containing a section on the gaseous state, though these topics are covered in physics in the South London and Woolwich courses. At Woolwich, where extra chemistry is provided for students wishing to progress to degree courses in chemistry, detailed studies of specific elements and colloids are included.

Both the quantity and level of chemistry contained within the Shirecliffe and the Mid-Warwickshire courses is less than that found in the previous three courses. In the Shirecliffe case the absence of organic chemistry, enthalpy and kinetics distinguish its content from standard entry preparations in chemistry; other topics within this course are studied to a level comparable with that within the South London, Southwark and Woolwich courses.

The Mid-Warwickshire course does not aim to prepare students for an HE course with substantial chemistry content. Hence the chemistry content is not academically high and is comparable to that of an 'O' level course. In some courses the chemistry input is not restricted to timetabled slots; specific instances where chemistry is integrated into other subject areas are discussed in Chapter 5.

Biology

Biology is a major component of five of the courses under study; only at Paddington and Vauxhall, where exits are to engineering and applied

physical sciences, is it absent. The substantial input of biology of South London, Southwark and Woolwich is reflective of exits to HE courses either in biology or where biology plays an important role. At Mid-Warwickshire, biology is the major subject of study and, although no specific HE links exist, it is clearly toward HE courses in biology that the Access course is directed. Similarly, at Shirecliffe, the range of biological topics studied is reflective of an aim to provide sufficient background to afford the possibility of entry into BSc courses in life sciences, physiotherapy and nursing. The major topics of biology content in these Access courses are shown in Table 6.

Table 6. Major topics in biology

	Mid-Warwickshire	*Shirecliffe*	*South London*	*Southwark*	*Woolwich*
Ecology	x	–	x	x	x
Classification	x	x	x	x	x
Cell structure/function	x	x	x	x	x
Energy/nutrition	x	x	x	x	x
Respiration	x	–	x	x	x
Transport	x	–	x	x	x
Homeostasis	x	–	x	x	x
Support and locomotion	x	–	–	–	x
Co-ordination and control	x	–	x	x	x
Reproduction	x	x	x	x	x
General evolution	x	x	x	x	x
Biochemistry	–	x	–	–	x

The topics chosen at Mid-Warwickshire, South London and Woolwich are very similar and bear a close resemblance to those studied within an 'A' level course. In fact, in Mid-Warwickshire, students are prepared so they can, if they wish, take an 'A' level qualification in biology. At South London, considerably less time is allocated to biology than in most of the other courses; however, certain aspects of biology are taught within other subjects.

At Southwark the biology is split into two themes – the whole organism and biochemistry, and physiology and microscopy – which are linked through interrelated topics.

In general, at South London, Southwark and Woolwich, it is emphasised that depth of study in certain areas is chosen in preference to breadth. At Shirecliffe this tendency is at its most extreme; a number of topics,

including ecology, transport, homeostasis, support and locomotion, co-ordination and control, are not studied at all.

Minority subjects

Computing Studies

An element of computer studies is included in the courses at Paddington, Shirecliffe, South London, Vauxhall and Woolwich. At Shirecliffe, South London and Woolwich this input is linked to the uses and application of computers, with opportunity being given for some hands-on experience. At Vauxhall, and particularly at Paddington, however, students are taught to develop single programs in BASIC (at Vauxhall) and PASCAL (at Paddington). Additionally, in a number of courses, CAL is used as a learning strategy in specific subjects. Examples of such methods are discussed in Chapter 5.

Engineering Studies

Only within the Paddington course is there an input specifically termed engineering. It is divided into three sections – workshop processes and practice, materials (dealt with under physics), and drawing. The former is a unit designed to familiarise students with the various hand and machine processes of an engineering workshop; hence it is a very practically based subject. Drawing also emphasises practice; the syllabus essentially covers the method of producing, reading and understanding engineering and electrical drawings.

At Vauxhall drawing is incorporated within a unit termed graphicacy. This subject is broader in its range than drawing at Paddington which is specifically designed for students entering HE courses in mechanical engineering. In the built environment course it is a common unit for all students and includes drawing techniques, statistical techniques, map studies, graphical presentation of statistics, freehand sketching of buildings and components, and use of colour in drawings, maps and designs.

Food Science

This subject is included only in the South London course which is linked exclusively to food-related HE courses. The syllabus includes an introduction to the various aspects of food studies in the widest sense; otherwise it is largely practically orientated, dealing with elements of food processing, food microbiology, and chemical and physical analysis of food.

Geography

Geography is included only in the Mid-Warwickshire course; in this

programme the syllabus is that of an 'O' level course in geography which, in fact, students are given the opportunity to take.

Communications and Study Skills

Some form of specific input of communications and/or study skills is included in all courses, apart from that at Mid-Warwickshire. At Southwark the input in this area is a two-hour bilingual support workshop. Such drop-in facilities are also available at Paddington and South London, but these courses, together with those at Shirecliffe, Vauxhall and Woolwich, also provide an input of study skills.

The time allocated to communications and study skills varies from one hour at Woolwich to eight hours at Vauxhall. However, in all courses, study skills includes the following broadly defined topics:

- personal organisation;
- use of libraries/computer data systems;
- reading;
- note-taking;
- writing essays/summaries;
- listening;
- speaking;
- examination techniques;
- self-evaluation.

In some or all of the courses, specific reference is made to more specialised topics, including seminar presentation, practical and experimental skills, data analysis and representation, and problem solving.

In all courses, the relationship between study skills and the content of specific subject disciplines has been considered. However, it is evident that a number of different strategies are employed; these are further discussed in Chapter 5.

5. CURRICULUM DESIGN AND DELIVERY

Introduction

In this section the report investigates the influences of various factors on syllabus design. It aims to show how particular content was chosen and how, within the curriculum, strategies for the integration of different subject areas are implemented.

The relationship between content, context and skills in maths, science and technology Access courses is also investigated. These issues are linked to styles of teaching and modes of assessment within the Access provision.

Influences on syllabus design

The content within all courses investigated was influenced by the content of one or more types of existing syllabus, namely:

- standard entry programmes, i.e. 'A' level or BTEC levels 1–3;
- syllabuses of linked HE courses;
- other established Access programmes.

Decisions as to specific content, delivery and assessment within the Access course have been found to be largely dependent on the balance between the FE college's practice, attitudes and assumptions and those of its HE counterparts. However, in certain instances, the influence of LEA representatives and Open College staff has been important in developing curriculum models.

Influences of standard entry programmes

The content, though not necessarily the delivery or assessment methods, associated with 'A' levels and BTEC programmes have had some influence on the content of all courses included in this study.

In one case at Mid-Warwickshire, the main subject, biology, follows exactly the same programme as the 'A' level and the minor subjects maths, chemistry and geography follow 'O' level syllabuses. However, the contents of all other courses are always less than that of any individual 'A' level subject or BTEC programme.

Often this content is derived through a selection of 'essential' elements from the closest and most familiar standard entry syllabus. For instance, at Vauxhall College the content is very much based on the standard entry requirements for HNDs in civil engineering, building administration and building economics. Although there is 'A' level entry to these HNDs, a common prerequisite is an ordinary BTEC diploma in the appropriate discipline and this is offered to non-Access students at Vauxhall.

Hence, in the Access course in built environment, maths is based on a selection from Level 1, 2 and 3 BTEC units; science and materials on a selection from physical science 1, materials in construction 2 and construction science 2; and graphicacy on a selection from units in drawing techniques, graphical presentation of statistics, map studies and statistical techniques. Other examples of syllabuses influenced by BTEC programmes can be found. At Paddington the engineering physics syllabus was influenced by a number of engineering science level 2 & 3 units. At Shirecliffe the physics syllabus was developed through a selection of topics from level 1 & 2 physical science units, while at Woolwich the chemistry programme is based on level 2 & 3 chemistry units.

The influence of 'A' level syllabuses is most prevalent in biology. At South London, Southwark and Woolwich the selection of topics in biology closely parallels those in 'A' level syllabuses, though in all cases only selected areas are studied in depth.

The core of 'A' level pure mathematics provides the basis for the maths syllabuses at Paddington and Woolwich, while at Southwark the 'essential' elements of chemistry 'A' level form the basis of the programme.

Although 'A' levels and BTEC programmes have been considered in the development of the bulk of Access courses in this study, their ultimate degree of influence is variable. In some cases they have been used with little or no adaptation; in other cases, because few or no other alternatives have been readily available, they have been used as a convenient reference point and subsequently cannibalised to fit a particular need.

The influence of receiving HE courses

Generally the development of these Access courses has been a co-operative venture betwen the FE college and the linked polytechnic/university. Hence there has been a unique opportunity for those involved in curriculum development to produce syllabuses that closely match the requirement of the linked HE course(s). In some cases this opportunity has been taken, whereas in others the provision has mirrored standard entry requirements simply because they are the existing criteria for entry.

The process by which the Access syllabuses were developed in relation to the content of HE courses has taken two distinct forms. In one type of development, such as those at Paddington and South London, the onus was placed on HE staff to identify the key concepts and content they considered necessary for the Access course. Subsequently, FE staff wrote a detailed syllabus largely matching HE requirements.

Alternatively, as in most of the other courses, FE staff initially wrote a syllabus based on elements of standard-entry programmes and first-year programmes within the linked HE courses. In such instances these syllabuses were subsequently modified after comment by HE staff.

In each model the curriculum was largely determined by the HE staff and this has led to courses with considerable content. The most common difficulty identified by FE staff was that of dealing with this considerable content in a one-year course.

The influence of existing Access provision

Difficulties created by content overload have been mitigated in some instances through the pedagogical practices employed in the FE sector. First, study skills on science courses have been developed and adopted from those already in operation in non-science Access courses. Although they may be no substitute for content, they can provide a valuable means of coping with it.

The case studies also provide examples of the Access practice of course integration. Traditional boundaries between subject areas are relaxed and content rationalised, so that repetition is avoided and ostensibly disparate material is presented in a broad interrelated fashion.

Integration through the maths syllabus

At Paddington, the simple expediency of transferring aspects of applied maths, namely kinematics, circular motion and simple harmonic motion, initially in the maths syllabus, to that for engineering physics has allowed more time for repetition and extension of more fundamental techniques within the maths programme. The course is further integrated by close liaison between maths and physics lecturers throughout the teaching programme.

At South London, aspects of basic arithmetic are taught in conjunction with chemical calculations which are introduced early in the chemistry programme. Similarly, simple algebraic concepts are taught in tandem with early work in physics. Such strategies are possible because maths is taught

by the chemistry and physics lecturers, both of whom are experienced maths lecturers.

At Paddington and at Vauxhall, topics such as forces, statics and dynamics, which might traditionally be in both applied maths and physics syllabuses, are covered respectively by engineering, physics and material science lecturers alone.

At South London, Southwark, Vauxhall and Woolwich, the application of maths to the sciences is an integral part of each course. At Woolwich, two hours of the maths programme is devoted to applications and problem solving, with separate classes for students progressing to biology and chemistry HE courses and those progressing to maths, engineering and materials science courses. Graphical work is related to real scientific data, with emphasis on the reduction of relationships to linear form. The exponential function is related to its practical applications such as radioactive decay, population growth, and growth and decay of electric current.

Also, at Woolwich, calculus is related to optimisation in technology and nature, while differential equations are related to topics such as Newton's law of cooling.

At South London, Southwark and Vauxhall similar strategies are employed.

In each of the courses, however, some emphasis within maths is placed on dealing with experimental data, linearisation of experimentally determined relationships, and growth and decay in science disciplines. At Southwark, elements of statistics are taught through biological models. Similarly, at South London, aspects of calculus are taught by application in a biological context, or by the integration of relationships found in chemical kinetics. At Vauxhall, substantial elements of statistics and graphical representation of statistics are taught in the graphicacy unit. Topics such as photograms, cartograms and statistical maps are related to the demands of courses within the faculty of the built environment at South Bank Polytechnic.

Integration between sciences and/or engineering

Although examples of strategies to integrate and contextualise maths are common, there is less evidence of integration between different science and/or engineering disciplines.

At Paddington there is close liaison between engineering science and physics, which has resulted in a physics syllabus related to the needs of engineering.

At South London, certain aspects of biology, chemistry and food science are related to each other. Here, while descriptive aspects of the function of biomolecules is dealt with in biology, detailed biochemical pathways are introduced in chemistry, and chemical analysis of biological materials is co-ordinated through food science. Microbiology is also taught in a contextual fashion, again through the agency of food science.

Balance of content and skills

An awareness of the importance of developing skills alongside and through content is a facet of most of the courses studied. A specific study skills input is included in five of the seven courses studied; a sixth, Southwark, while previously having such a provision, has recently discontinued it.

Two distinct schools of thought emerge from those questioned in this study. One, as exemplified by Southwark, is that the teaching of study skills is implicit in any subject discipline and that particular aspects of a subject can be highlighted to emphasise a fundamental principle with broad applications. For instance, at Southwark, a certain volume of content in organic chemistry is 'sacrificed' in order to consider broader concepts underpinning the subject, in this case reaction mechanisms.

The second approach to a greater or lesser degree isolates study skills from content by providing a separate slot for it. In most cases this input is taught by staff experienced in teaching communications, study skills or general studies, but without a scientific or technical background and the lack of this has caused some difficulties. The practice of using a science content as the vehicle for study skills development has not always succeeded because the subject matter chosen is often peripheral to the central thesis of the discipline.

Overt strategies have been employed at some colleges to overcome these difficulties and integrate study skills closely with content. At South London College a study skills class is double-staffed with both a study skills and a science lecturer.

At Paddington, South London and Vauxhall, project work is used as a method of integrating skills and content. At Paddington this is an engineering project which is completed during the third term. At South London, the food-related project is introduced towards the end of the first term and is used as the basis of an individual content-based study skills programme during the second term.

At Vauxhall, the whole course has been developed with an emphasis on the underlying skills of the various disciplines. The syllabus was analysed for

the process skills required by the BTEC objectives which had been selected. Subsequently, individual subject skills checklists and a whole course skills checklist were drawn up. These checklists are used throughout the course to assess a number of assignments and five longer projects. These projects are designed to give students experience of a range of methods of working and presentation.

Teaching/Learning strategies

The responses of FE lecturers questioned during this project do not indicate that there is a particular Access 'style' of teaching. However, most respondents indicated that they did take a different approach by comparison with that taken with younger students, and certain methods were common to most courses. Among these were:

- *The employment of typical HE delivery strategies.* With little or no exception, the style of teaching on linked HE courses is one of formal lectures, laboratory or workshop-based practicals and small group tutorials. It was clear that some FE lecturers were aware of this approach and were consciously adjusting their style to prepare students for these formal methods of presentation.

- *A slow-paced start with a lack of formality.* A question-and-answer approach is favoured over formal lectures or dictation. Lecturers draw upon the life experience of students and try to relate mathematical and scientific knowledge to personal experience. The style of delivery is changed gradually towards a more formal approach, lecture-based to reflect the impersonal style of HE. Students are directed to take an active role in their own learning, and co-operative methods such as working in groups are encouraged. Initial practical work is very clear-cut but, progressively, a greater element of problem solving is introduced.

- In mathematics the approach is student-centred and workshop-based. Emphasis is placed upon students progressing at their own pace, using independent learning materials.

A number of lecturers expressed a view that Access students expected a 'traditional' approach such as they had received at school, despite the fact that for many of them this was the method of a system that had allowed them to underachieve. Often they resisted or were suspicious of unfamiliar learning methods. A minority of lecturers felt that they did not consciously alter their style when teaching Access students. One lecturer commented that he could afford to be 'old-fashioned and formal' when students are committed and highly motivated.

Learning and materials

A certain amount of tuition is available through CAL and distance learning methods, but generally these methods do not have a high profile. A number of colleges, however, do view them as appropriate for adults because of their strong motivation. A specific example of the use of learning guides is found at Southwark. Here, within the chemistry programme, students are issued with selected texts from the ILEA's ILPAC learning guide for 'A' level chemistry. These are used as back-up material for a number of topics and help reduce the amount of note-taking. Some lecturers felt that suitable software for their students was not readily available or that they were not sufficiently aware of its availability, or that terminals were not easily accessible to students.

On some courses, student access to polytechnic facilities allows for a greater range of learning opportunities. For instance, the libraries of many polytechnics provide a range of CAL materials and videos not available in colleges.

Modes of assessment

With the exception of the Vauxhall course, the case studies have largely similar modes of assessment – a mixture of continuous assessment and unseen tests, either phase tests or examinations. The weighting of continuous assessment to unseen tests is variable, but generally the balance is fairly even.

Within these six courses, each discipline is generally assessed using the same scheme, though at Shirecliffe there is some variability in the weighting of each mode from subject to subject. At South London, unseen papers are used only in major subjects, with continuous assessment being used in support subjects.

Three of the courses, at Paddington, Shirecliffe and South London, also assess by means of a project integrating the various disciplines with a theme central to the course.

Vauxhall alone assesses without any formal examinations. Instead, a variety of types of assignments is skills checklisted within each subject and eventually the whole course checklist is produced. It is noteworthy, however, that among the five projects also assessed as part of the whole-course profile is project 5, 'a series of timed answers in various subject areas'. Staff at Vauxhall have stressed the positive aspects of their form of assessment which allows students to play an active role in their own learning through regular self-assessment. They suggest that their scheme

creates a rapport between staff and students not present in traditionally assessed courses, and allows regular diagnosis of students' difficulties. The inclusion of some form of timed test, however, even though it is seen at Vauxhall as exam practice and is not of a pass/final nature, is an indication that even in the most radical of approaches this type of assessment is taken into consideration.

Both at Vauxhall and at the majority of other colleges, the insistence on an assessment method involving formal examination comes from the polytechnics. Examinations have been included not because FE staff perceive them as a particularly reliable mode of assessment, but because they still constitute the main assessment mode in HE. As a result, while there is a consensus that examinations should be included as a preparation for HE, there are reservations as to the weighting that should be attached to the results.

6. THE STUDENTS

This section of the report looks more closely at the students who enrol on Access courses in maths, science and technology. Cumulative enrolment figures have been drawn up in Table 7, covering the period over which each course has been running, with the data broken down by gender and, in limited terms, by ethnicity.

Table 7. Cumulative enrolment totals (from beginning of course to 1986–7)

		Total	*Male*	*Female*	*Ethnic minority*	*White European*
Mid-Warwickshire	(from 1985–86)	23	6 (26%)	17 (74%)	1 (4%)	22 (96%)
Paddington	(1985–86)	16	14 (88%)	2 (12%)	9 (56%)	7 (44%)
Shirecliffe[1]	(1981–82)	31	23 (74%)	8 (26%)	6 (19%)	25 (81%)
South London	(1984–85)	52	11 (21%)	41 (79%)	19 (37%)	33 (63%)
Southwark[2]	(1979–80)	197	113 (57%)	84 (43%)	113 (57%)	84 (43%)
Vauxhall	(1983–84)	62	43 (69%)	19 (31%)	31 (70.5%)	13 (29.5%)
Woolwich	(1983–84)	70	56 (80%)	14 (20%)	31 (44%)	39 (56%)
Total		451	266 (59%)	185 (41%)	210 (48.5%)[3]	223 (51.5%)[3]

Notes: [1]These figures represent four intakes; no intake in 1982–3 or 1986–7.
[2]Data from 1979–80 to 1982–3 is for the whole course at Southwark since no options existed then. From 1983–4, data is for options C,D,E combined.
[3]This figure excludes data for 1983-4 when an ethnic breakdown for Vauxhall was not available.

Selecting Access students

The process of selection is very similar for each course, apart from Mid-Warwickshire, using unseen tests in English and Mathematics, and subsequently interviews. At Mid-Warwickshire no tests are given; students are selected on the basis of previous experience and qualifications, and their motivation as demonstrated in an interview.

At Shirecliffe and Southwark, testing of applicants is not undertaken if they possess appropriate qualifications in maths and English at 'O' level or equivalent. Where an English test is used, it consists of either a comprehension exercise or an essay; the subject matter of the test is often related to the theme of the Access course.

A variety of maths tests is used. At South London and Vauxhall an Open College test covering basic arithmetic operations and some interpretation of charts and graphs is employed.

The same test is supplemented with additional questions in algebra at Woolwich. At Southwark, a standard college maths entrance test which covers the whole range of mathematics within an 'O' level course is used for unqualified applicants.

At Paddington there is a third test to determine aptitude for engineering.

Interviews are used by all courses to determine at first hand the candidate's motivation, degree of realism, and financial and domestic situation. Generally, interviews are conducted by two or more college staff. Only at South London and Vauxhall are HE staff involved directly in the selection process. At Southwark, HE staff were originally involved, but this is not considered to be necessary any longer. London courses follow very comprehensive guidelines for interviewing set out by the ILEA. For these courses, evidence of disadvantage in earlier education must be demonstrated if students are to be eligible for discretionary awards. Although none of the courses is specially directed at a particular gender or ethnic group, all the ILEA courses actively encourage women and ethnic minority groups to apply.

Gender of students

The data of Table 7 indicates that, of the 451 students who have enrolled on the seven courses under investigation, 41% are female and 59% male. These overall figures cover individual course percentages which vary from a 39% female intake at South London to a 12% intake at Paddington. Overall, a clear trend emerges. A higher proportion of female students is enrolled in courses linked to exit routes in which chemistry and, in particular, biology are principal disciplines. Conversely, for courses in which the principal exits are maths, the physical sciences, engineering or technology, there is a greater proportion of male students. In the courses at Paddington, Vauxhall and Woolwich*, the percentage of men varies from 69% to 88%.

Ethnicity of students

The data in Table 7 indicates that, overall, 48.5% of the students enrolled on these Access courses come from some ethnic minority group; the remaining 51.5% are White European. The proportion varies from course to course. The minority intake at Vauxhall is 70%, while at Mid-Warwickshire it is only 4%. Overall, there appears to be no relationship between the ethnicity of those enrolled and the subject content of the

* Woolwich has exits that fit both categories but, in practice, a greater proportion feed onto a link that is non-biological. Shirecliffe has such a broad range of exits that no meaningful conclusions can be made.

Access course. However, the data does indicate a greater proportion of students from ethnic minority groups within the ILEA courses.

A further analysis of the enrolments by specific ethnic groups is given in Table 8.

Table 8. Cumulative enrolment totals by ethnic groups (from beginning of course to 1986–7)

	Total	*Afro-Caribbean*	*African*	*Asian*	*Other*[1]
Mid-Warwickshire	23	1 (4%)			
Paddington	16	1 (6%)	4 (25%)	2 (12.5%)	2 (12.5%)
Shirecliffe	31	6 (19.5%)			
South London	52	11 (29%)	7 (13.5%)		1 (2%)
Southwark	197	52 (26%)	36 (18%)	17 (9%)	8 (4%)
Vauxhall[2]	44	20 (45.5%)	7 (16%)	2 (4.5%)	2 (4.5%)
Woolwich	70	9 (13%)	10 (14%)	10 (14%)	2 (3%)
Total	433	100 (23%)	64 (15%)	3 (7%)	15 (3.5%)

Notes: [1]Iranian, Chilean, Cypriot, Philippino, or Iraqi.
[2]These figures do not include 1983–4 when an ethnic breakdown was not available for Vauxhall.

This breakdown shows that the largest ethnic minority group is Afro-Caribbean at 23%. A relatively low proportion of uptake by Asians is in accord with research findings by the ILEA that indicate a similar trend over a range of Access courses[26]. Three courses at Mid-Warwickshire, Shirecliffe and South London attract no students of Asian origin at all, and the absolute numbers at Paddington and Vauxhall of two and one respectively are low.

Views of Access students

Questionnaires were distributed to all 70 Access students still studying on science routes within the seven case study courses at or near the end of the 1985–86 Access year. Distribution was facilitated by the Access course tutor or a subject tutor; anonymity was assured for all respondents. Questionnaires were completed by 28 students representing 40% of the sample; responses were received from students on all the courses, except those at Paddington. The sample was heterogeneous and small. The response was greater from some courses than others, and hence should be treated with care. At best the data should be considered as giving possible indicators of student concern.

Preparation in specific disciplines

Students were asked to comment on the merits and deficiencies of their preparation in the various subjects of their Access course. Table 9 shows the number of students expressing dissatisfaction with particular subjects.

Table 9. Student perceptions of Access curriculum

	Number taking subject	*Dissatisfied*	
Maths	26	6	(23%)
Biology	19	5	(26%)
Chemistry	24	3	(12.5%)
Physics	20	3	(15%)
Communications/study skills	27	11	(41%)

It is clear that the students' greatest concern relates to communications and study skills. The major specific complaints were:

- The subject matter was not related to other studies.
- The level was too low.
- There was not enough flexibility to cater for individual needs.
- The subject should have been centred around the project.

In maths, criticism was almost exclusively concerned with teaching method; students found difficulties in learning within a workshop context and generally expressed the view that they would have liked more teaching from the blackboard.

In biology the major criticism was directed towards the balance of content in one particular course; they felt that a disproportionate amount of time was spent on ecology at the expense of physiology and nutrition.

In chemistry and physics, though there were individual difficulties in particular areas, no general trends seemed to emerge.

Skills preparation

Students were asked to comment on their preparation in a number of study skills; their responses are tabulated in Table 10.

Table 10. Students' perceptions of study skills preparation

	More preparation required	*Adequate preparation*	*Less preparation required*
Essay writing	13 (46%)	12 (43%)	3 (11%)
Examination technique	17 (61%)	11 (39%)	0
Notetaking	10 (36%)	17 (61%)	1 (4%)
Seminar presentation	10 (36%)	18 (64%)	0
Library use	9 (32%)	19 (68%)	0
Practical work	11 (39%)	17 (61%)	0
Working individually	11 (39%)	15 (54%)	1
Working in groups	9 (32%)	19 (68%)	0

There appear to be two main areas in which students express concern – essay writing and examination techniques. Almost half the students felt they required more preparation in essay writing; six out of ten did not feel well enough prepared for examinations. In the other skills areas, about one-third felt they required more preparation.

Academic and personal support

Of this sample of students, 82%(23) were satisfied with the academic support they received within the Access course, while 89%(25) found their personal tutorial support satisfactory. Those who specified their concerns wrote of the difficulty of finding staff or the variability of support across the various subject areas.

Preconceptions and adjustment

Students were asked whether the Access course met their preconceptions. The responses received were:

- 28.5%(8) felt it met their preconceptions;
- 61% (17) found it different from these;
- 10.5%(3) made no comment.

Of the 61%, nine specified that they had found the course harder than they had estimated and only three had found it easier.

Those who had found their course more difficult frequently commented on the quantity of work they had to undertake.

When asked whether they had been prepared for a change in lifestyle when starting the Access course, 46%(13) responded positively; 32%(9) replied

that they had not prepared themselves for the demands of the course and indicated that they had had difficulties in adjusting their social and domestic life; 36%(10) had suffered either financial or domestic difficulties during the course of the Access year. However, only 18%(5) indicated that they would have preferred a more flexible part-time course or a longer one.

Employment and status

Students were asked to give their employment status prior to entering the Access courses. The following data was collected:

Unemployed	50%(14)
Employed and waged	39%(11)
Employed and unwaged	7%(2)
No response	4%(1)

46%(13) felt their status had improved since they had joined the Access course, and 39%(11) thought their employment prospects had improved. Conversely, 36%(10) thought there was no change in their status, and 46%(13) felt there would be no improvement in their likelihood of finding a job. However, many of this latter group were reserving their judgment until they progressed onto the degree course.

Views of Access students in HE

Questionnaires were given to 45 students who were at linked HE institutions. Distribution was facilitated by Access co-ordinators and course directors in HE; anonymity was assured for all respondents. The timing of the initial research work meant that none of these students had come from the Mid-Warwickshire or Paddington courses. At the time of the survey, most respondents were completing or had just completed their first year in HE.

Twenty-six students completed the questionnaire, representing 58% of those to whom it had been sent. The sample is again small and heterogeneous and should be used only as an indicator of possible trends.

Preparedness

Of the students, 61.5%(16) felt they had been adequately prepared for their HE course, 27%(17) were not sure or could not comment on their preparation, and 11.5%(3) felt they were not adequately prepared.

Academic difficulties in HE

Students were asked whether they found any part of their course particularly difficult. In every case but one respondents indicated some

problematic area. The cause of concern for the majority was a specific academic area; the greatest concern was expressed with regard to mathematics – 42%(11) experienced some difficulty in this subject. No other subject caused anywhere near this level of concern, with computing at 11.5%(3) the next most troublesome subject. Other subjects such as chemistry, electronics, land surveying and physiology were mentioned by individuals as being problematic, but there was no indication that these were other than isolated difficulties.

Preparation in particular subjects

Students were asked to reflect on their preparation in particular subject areas. Only two (8%) felt badly prepared in mathematics, though, significantly, 11(42%) remarked that they wished they had had more content within their maths programme. In most cases they called for more preparation in calculus.

Three (14%) of the 21 students who took biology felt badly prepared in this subject. Again, eight (38%) expressed a desire for greater preparation in a certain topic area, though there appeared to be no overall trend as to any one particular topic.

Only one (4.5%) of 22 respondents taking chemistry was dissatisfied with the preparation and, in contrast to other subjects, suggested that more content should be included in the Access course.

Only two (9.5%) of the 21 students taking physics did not feel adequately prepared. Another three, though generally happy with their Access preparation, expressed a desire for greater content in certain topics.

Skills preparation

Students were asked to comment on their preparation in a number of specific skills. Their responses are tabulated in Table 11.

Table 11. Students' perceptions of skills preparation

	More preparation required	*Adequate preparation*	*Less preparation required*
Essay writing	13 (50%)	11 (42%)	2 (8%)
Examination technique	11 (42%)	15 (58%)	– (0%)
Notetaking	5 (19%)	19 (73%)	2 (8%)
Seminar presentation	14 (54%)	11 (42%)	1 (4%)
Library use	3 (11.5%)	21 (81%)	2 (8%)
Practical work	5 (19%)	19 (73%)	2 (8%)
Work individually	6 (23%)	19 (73%)	1 (4%)
Working in groups	8 (31%)	17 (65%)	1 (4%)

This data indicates that there were three areas in which more than 40% of the students felt the need for greater preparation – seminar presentation, essay writing and examination technique. Conversely, about 70% or more felt at least adequately prepared in notetaking, library use, practical work, working individually and working in groups.

Academic and personal support

All students, bar one, were satisfied with the academic and personal support provided within their Access course. Eight (31%) responded that they experienced difficulties in obtaining academic help in HE and six (23%) felt a lack of personal tutoring support.

Transition

Of the students, 58% (15) indicated that they were not prepared for the change of style from FE to HE. The following were the most common difficulties experienced in the transition phase:

- the impersonal nature of HE, both in terms of the distance and attitudes of lecturers and the anonymity of large groups of students (27%);
- an unexpectedly high academic standard (15%);
- an unexpectedly high volume of work (15%).

Other difficulties with lecturing style, tutorial support and examinations were expressed, but only by particular individuals.

Reactions of HE staff and students

Access students were asked how they were perceived by HE staff and by fellow students who had not entered the course via the Access route. Eleven (42%) felt HE staff considered them no different from other students; 27%(7) thought they were viewed in some negative fashion, either as weaker, 'slow but willing', or looked down on and labelled as Access. Conversely, 19%(5) felt positively supported by staff in HE.

Fewer students – 19%(5) – felt themselves perceived by fellow students as being typical of the group. Only 15%(4) experienced negative reaction from their peers, either for being too serious, weaker academically or unapproachable. 35%(9) felt positively received by other students and some clearly felt themselves viewed as leaders or mature advisers.

Extra-curricular difficulties

Of the students, 38%(10) replied that they had experienced either financial,

personal or health problems during their course of studies and 27%(7) thought that either a part-time, longer or more flexible period of study should be available.

General comments

Although this group of respondents represents only those who chose to complete the questionnaire, some comments from individuals raise important questions. Below is a selection of quotes:

'I loved the Access Course and still feel closer to many Access students than to most students at . . . (HE institution)'.

'I would not recommend it to anybody; students receive little encouragement and many perform well below their abilities. This seems particularly so for Black students who may have experienced prejudice and needed encouragement and caring more than others. This is not recognised by staff'.

'One does perhaps take for granted how approachable the teaching staff are on the Access course, whereas in higher education the teaching staff (the majority) always want to maintain a "safe distance", to the extent of becoming totally unapproachable'.

'I wasn't expecting to feel quite so decrepit and I thought the polytechnic would be a little bit more mature in attitude than it is . . . The only pressure is that if you don't do the work you get kicked out – simple really! It's an excellent polytechnic with a tremendous amount of resources. I am enjoying the course and recommend it to anyone heading in this direction.'

'. . . not as good a course as I would have hoped: bad teaching – too large a class – too wide a variety of subjects – many people don't take the course seriously (both lecturers and students)'.

'On the whole it (the Access course) was good, very good actually – possibly too good! Slightly claustrophobic; somewhat spoon-fed . . .'.

'The main change in HE is in the nature of the learning which seems passive. Large groups are inhibiting and impersonal with little time for feedback or discussion . . . very reminiscent of school. HE staff don't seem to have any idea (or certainly don't appear to) that there are any older students on their course, judging by their somewhat patronising attitudes sometimes'.

'I found the intensity of the Access course extremely difficult and tiring to cope with, due to domestic and medical difficulties'.

'Major bonus of the (Access) course was that it absorbed that initial period of uncertainty and anxiety associated with returning to education at a higher level'.

'I think that more emphasis should be placed on each student's individual needs (in the Access course)'.

'. . . the standard is much higher than we are led to believe'.

'As a single parent of an eight year old, I have found it difficult to give enough time to study and to keep up with the fast pace of the course . . . Also, a chronic liver complaint has resulted in loss of energy'.

'The course should be modelled more closely to the way courses are run in higher education. The major way of assessment in HE is through examination and this should be emphasised in the Access course'.

'Study skills could be extended to include a visit on dealing/surviving in a very large institution'.

'The amount of work and homework was a bit of a shock. Also the human failings of HE lecturers and the poor standard of organisation and communication were not expected'.

7. PROGRESSION ISSUES

Table 11 demonstrates the considerable variation from course to course in the numbers of Access students progressing to HE. Table 12 provides cumulative progression data covering the entire period over which each course has been running, up to 1985–6.

Table 12. Cumulative student progression data (from beginning of course to 1985–6)

	From	*Total*	*Non-completion*	*Failed Access course*	*Passed Access course*	*To linked HEI*	*To non-linked HEI*
Mid-Warwickshire	1985–6[1]	14	4 (29%)	7 (50%)[2]	3 (21%)	1 (7%)	2 (14%)
Paddington	1985–6	16	3 (19%)	2 (12%)	11 (69%)	4 (25%)	6 (37.5%)
Shirecliffe	1981–2	31	4 (13%)	0 (0%)	27 (87%)	23 (74%)	3 (10%)
South London	1984–5	52	9 (17%)	6 (11.5%)	37 (71%)	23 (44%)	16 (31%)
Southwark	1979–80	197	59 (30%)	37 (19%)	101 (51%)	60 (30.5%)	34 (17%)
Vauxhall	1983–4	62	10 (16%)	0 (0%)	52 (84%)	51 (82%)	1 (2%)
Woolwich	1983–4	70	23 (33%)	10 (14%)	37 (53%)	34 (48.5%)	3 (4.5%)
Total		442	112 (25%)	62 (14%)	268 (60%)	196 (44%)	65 (15%)

Notes: [1]Progression figures for Mid-Warwickshire for 1986–7 were not available at the time of publication of this report.
[2]Fail may not be the appropriate term for the Mid-Warwickshire course since most students do not take the Access assessment procedures, opting for 'A' levels instead. Hence failure of 'A' levels is largely the basis of this data.

This data shows that, from a sample of 442 students enrolling on Access courses in maths, science and technology, 61% have passed and 59% have progressed to a HE course; 14% failed the Access course and 25% withdrew from it. These overall statistics contain considerable course variations, from 21% passing at Mid-Warwickshire to 87% at Shirecliffe. The low figure at Mid-Warwickshire is largely caused by non-completion and represents only one year of that course; it is mitigated to an extent by the fact that four of the eight students who did not complete are repeating the Access year during 1986–7. Overall progression figures are very much influenced by the Southwark course which contributes almost a half of the students in the sample. Hence its relatively low pass rate of 51%, although very similar to that at Woolwich, has a much greater effect on the average figures. Discounting the Mid-Warwickshire figures, the courses can be grouped into two categories on the basis of progression data: the courses at Southwark and Woolwich with similar pass rates of 51–53% and the

courses at Paddington, Shirecliffe, South London and Vauxhall with pass rates of 69–87%. Apart from the Mid-Warwickshire course, the rate of non-completion is fairly consistent.

At Shirecliffe and Vauxhall there have been no failures in the Access course; in all other courses, apart from Mid-Warwickshire in which 50% did not successfully complete, between 11.5% and 19% of students failed.

The performance of Access students in HE

Only limited information is available concerning the performance of Access entrants in HE. Within this sample, the vast majority of HE course completions are from the Southwark course which has been running two years longer than any other.

Other data is mainly restricted to student progression beyond the first year – taken from South London, Vauxhall and Woolwich. Figures were not available from Shirecliffe and do not yet exist for Mid-Warwickshire and Paddington.

From the Southwark courses, 75 students progressed to HE over the six-year period 1980–1985, 53 to the modular degree scheme at City of London Polytechnic (CLP), and 22 to other institutions. As of the end of the academic year 1985–6, 42 (56%) had either successfully completed their courses or were still in the HE system. A complete breakdown of progression statistics from Southwark is given in Table 13.

Table 13. Progression of Southwark Access students 1979–80 to 1984–5

	1979–80	*1980–1*	*1981–2*	*1982–3*	*1983–4*	*1984–5*	*Total*
Students entering CLP	5	8	10 (+1)[1]	17	10	2	53
Withdrawals from CLP	3	4	5	9 (+1)	5	0	27 (51%)
Still in CLP system	0	0	0	3	5	2	10 (19%)
Successful completions CLP	2	4	4	4	0	0	14 (26%)
Unsuccessful completions CLP	0	0	2	0	0	0	2 (4%)
Students entering other HEI	3	0	5	3	8	3	22
Withdrawals from other HEI	0	0	1	0	3	0	4 (18%)
Still in other HEI system	0	0	1	2	5	3	11 (50%)
Successful completions other HEI	3	0	3	1	0	0	7 (32%)

Note: [1]Includes one student who did not pass the Access course.

In comparing the two sets of data for progression to the linked institution and to other HE institutions, there appears to be some divergence in success rate. At CLP, 45% of those entering the modular degree scheme

have either gained degrees or are still at the polytechnic, with another 51% having withdrawn from the course. Corresponding data for entrants to other institutions shows that 82% have successfully completed or are in the process of doing so, with only 18% withdrawals.

A detailed analysis of student performance by Access students at CLP, previously carried out by Singleton[32], demonstrates that biology, a subject likely to be taken by most Access students in their first year, has a higher than average failure rate in comparison with other subjects. She has concluded that the overall pass rate in this subject for Access entrants is in fact not 'noticeably worse than for other students', though these comparisons are difficult to make, given the small samples.

Singleton's analysis is consistent with the view expressed by polytechnic staff that personal problems are responsible for a majority of student withdrawals and that only a few are the result of academic difficulties. Of a group of 17 students who withdrew from CLP, domestic, health, financial or other personal problems were thought to be a major factor for 14.

However, it is felt at CLP that a number of Access students have had academic difficulties. In the modular degree scheme, a basic course provided for the first semester has been designed to accommodate any entrant without the requisite 'A' levels. Access students seldom have difficulty at this level but, in common with some other students, often have problems in the transition from first to second semester when the pace increases as introductory and, later, advanced units are studied. Staff at CLP generally felt that the Access preparation was sufficient in biology. However, it was felt that in both the Access course and the basic physical science unit at the polytechnic, a lack of organic chemistry content created difficulties when students took introductory units in that subject.

CLP staff felt that science needed to be studied over a longer period of time. They felt that certain skills and knowledge could only be gained by study over a period of years by an 'osmotic effect'. One lecturer commented that while there was no obvious correlation between 'A' level points scores and ultimate academic success at degree level, the greater exposure of the two-year course gave better preparation. Some staff at CLP felt that Access students needed more encouragement to approach academic staff to discuss difficulties. They appreciated that students had particular difficulties in certain skills areas, particularly in essay writing and examination techniques, and that support for developing these at CLP was limited. It was likely that, as a result of a forthcoming review of the first-year course, extra subject-related study skills and tutorial support might be incorporated into all mature student programmes.

It is clear from the responses of staff at CLP that the performance of Access students has led to a jaundiced perception of their abilities. One member of staff felt that there was a general view that Access students are less likely to perform well and so staff are less keen to get involved. Another commented that his colleagues were surprised if an Access student was doing well.

Fourteen students from the Access course in built environment at Vauxhall College have completed at least one year in one of the HNDs in civil engineering studies, building administration or building economics, having entered these courses in 1984 to 1985. Progression statistics are listed in Table 14.

Table 14. Progression of Vauxhall Access students to South Bank Polytechnic, 1984–5

	Civil engineering studies	*Building administration*	*Building economics*	*Total*
Students entering	7	4	3	14
Withdrawals	2	0	1	3 (21.5%)
Still in system	1	3[1]	2	6 (43%)
Successful completions	2	0	0	2 (14%)
Failures	2	1	0	3 (21.5%)

Note: [1]Includes two students who failed and are repeating the course.

These statistics indicate that 57% (8) of the students have either successfully completed the course or are still in the system. However, two of these failed their first year and are repeating the course.

These figures need to be studied in the context of the overall statistics for courses. For instance, in 1986 in the HND civil engineering studies course, of 25 students only five passed their first year examinations at the first attempt, nine were referred in at least one subject, and 11 failed. In the HND in building administration, of 28 students four passed at the first attempt, 14 were referred (and subsequently passed), and 10 failed. Hence, in these two courses in 1986, there was a failure rate of 40%. Set in this light, the success rate for Access entrants is comparable to that of other students.

Course directors of each of the three linked courses felt that the major difficulty for Access students was mathematics or topics in subject areas with a high maths content. However, students entering by other routes shared this difficulty, particularly those entering civil engineering or building administration through a BTEC construction studies route. They

were, however, perceived to be at an advantage in comparison with Access entrants because of their greater familiarity with the terminology used in the construction industry and their background knowledge of the subject.

The course directors in civil engineering studies and building administration felt that any lack of success of Access entrants could, in part, be related either to lack of relevant maths and science content or to lack of preparation for examinations on the Access course. One course director thought that lack of skill in notetaking and difficulty in coping with the volume of work were particular problems. An alternative view from the building administration department indicated that Access entrants (and others) felt abandoned on the course (because of the 'distance' created by conventional HE lecture-based teaching methods. There was a lack of pastoral care and it was suggested that the polytechnic might model its tutorial system on that available during the Access course.

By contrast, in building economics, the course director felt that the success of Access students in HE was clearly related to their greater capacity for work and their better-developed study skills. The success rates of Vauxhall Access students who have progressed on to these more mathematically based HE courses in the built environment can be compared to their counterparts who exited to degree courses in architecture and (predominantly) town planning. Of 14 Access entrants who have completed at least one year at South Bank Polytechnic on these courses, 11(78.5%) are still in the system of whom three (21%) have had to repeat a year.

Progression from South London College

Only one cohort of students from South London College has completed at least one year in HE. Of this small sample of nine students, six (67%) successfully completed the first year, two (22%) withdrew for health or domestic reasons, and one (11%) failed. However, both the withdrawals intended to resume their courses and the student who failed transferred from a degree programme to an HND course in the subsequent year. Since progressions from the food studies course were to six different HE exits, three linked and three non-linked, it has proved difficult, in general, for HE staff to comment on the performance of students. However, one HE course director who had taken three of this group commented that Access students had performed as well as any other and been well prepared. He felt their maturity and innovation could be a driving force for the whole course.

Progression from Woolwich College

Thames Polytechnic has recently analysed the performance of 15 students who have gained entry from the science Access course at Woolwich College

over the three years 1984–86. Of these, 11 (73%)* have successfully completed at least one year of a degree or HND course; three, however, have had to repeat a year of their degree or have failed at the end of the first year on a degree course and then successfully completed a year of an HND course. One student (7%) has failed and withdrawn and three (20%) withdrew before the end of the first year.

* This figure includes three students from 1986/7 who have been referred in certain papers from their first year exams.

8. RESOURCING

The question of resources was prominent within all the case study courses. All, apart from that at Shirecliffe, are designated as full-time and hence the availability of student awards is a key issue. Minor awards are available at Mid-Warwickshire, whereas major discretionary awards are offered within the ILEA. The availability of grants was felt, by many staff and students, to be a major influence in aiding study. Where students studied part-time (often as in-fill on full-time courses), difficulties arose in relation to factors such as the DHSS '12-hour' and '21-hour rules' and invitations to join the Restart programme.[1]

Within the FE system, the extent to which colleges have received additional resources varies. One course had received a Lecturer 2 post; others have received 500 PT hours or no extra resources at all and have been dependent on the transfer of staff from other, under-subscribed courses. Where greater teaching resources have been provided, courses with more options have been developed – at South London, Vauxhall and Woolwich – and regular fortnightly course team meetings have been possible.

The involvement of HE staff

The resource implications of Access courses apparently cause more difficulties within the HE sector. The commitment of HE to Access was found to be very variable in terms of resourcing. In only one case was a polytechnic lecturer allocated time to act as a liaison tutor (at PNL for the link with food studies). All other links were dependent entirely on the goodwill of polytechnic staff; in some cases these links were negligible and appeared to cause difficulties for FE course organisers.

In most cases, however, HE staff contribute to open evenings, selection interviews, introducing students to the polytechnic, curriculum review and membership of course boards; but only on two courses – at Paddington and South London – is there a teaching input from HE staff. At Vauxhall and Woolwich such provision, though initially present, has been discontinued.

In most courses the polytechnics provide other resources in the form of accommodation, use of laboratories and access to facilities such as libraries. In this sense, Access students have largely the same 'rights' as other polytechnic students.

Access policies in HE institutions

The status of Access students and Access courses varies from institution to institution. Although, in the case of the five ILEA courses, guaranteed

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places are offered to successful students, a certain degree of ambiguity exists in the relationship between Access courses and their linked HE institution. The ultimate decisions on acceptance rest with HE admissions tutors or course directors; the vetoing capacity of course directors has conflicted with inter-institutional agreements. This difficulty and other breakdowns in communication appear to be a particular problem in the case of multi-exit courses where an Access course tutor has to work with course directors in a number of exit courses in different faculties within different polytechnics.

In the absence of clear institutional policies in polytechnics, uninformed course directors may be expected to take uninformed decisions. In some HE institutions, examples of clear directives towards Access issues have been taken. For instance, at the Polytechnic of North London to which the food studies course links, an Academic Standards Committee (ASC) working party on Access courses was set up in 1986. This working party, which includes teaching staff from receiving courses and representatives from feeder colleges, was set up to make recommendations to the ASC on the co-ordination, development, support and recognition of Access courses and to undertake an annual appraisal of each course. An overall objective of these procedures is to provide Access students with the status of standard entry.

A further illustration of PNL's commitment to Access issues is that it rewards departments accepting Access entrants with 1.5 units of resource, rather than the one unit for students entering through traditional routes. Other institutional features at PNL are indicative of the types of changes occurring elsewhere in polytechnics accepting Access students. Within the Adult and Continuing Education (ACE) Centre are a number of sections concerned with Access issues, including the Access Unit which provides a 'focus for the development of (Access) work' and the North London Open College Network – Access to Learning for Adults (ALFA) – which aims to promote education opportunities for adults through the encouragement of collaboration between AE, FE and HE.

Features such as Open College networks are not unique to PNL. At the South Bank Polytechnic, for example, the appointment of a member of staff to develop Access links as one of four full-time Open College posts, and the appointment of co-ordinators in local FE colleges have provided resources for Access initiatives.

The courses at Paddington and Shirecliffe are also affiliated to Open College networks – Central and West London (CAWLOC) and South Yorkshire (SYOC), respectively. The emergence of SYOC has provided a forum for the discussion of issues related to Access, particularly in relation to Sheffield

City polytechnic. However, it is the direct intervention of representatives of Sheffield LEA that have had greatest effect in affecting the provision at Shirecliffe. The LEA has agreed with the faculty of technology a system which offers Access links to all courses, with an approximate 10% availability of places on any one course. This type of arrangement, similar to that in ILEA, will provide in future an institutionalised base previously lacking in the Shirecliffe/Sheffield City polytechnic link. Other facets of future arrangements are the rationalisation of provision within the LEA so that Shirecliffe and another college at Stannington will share the Access provision. While Shirecliffe will offer preparation in 'pure' and 'life' sciences, Stannington will make available a provision in engineering and information technology.*

Validation and recognition

The publication of the White Paper *Meeting the Challenge* (March 1987) has stimulated national bodies to increase their involvement in 'developing a national framework' for Access course validation. It now seems that CNAA, with the support of the Committee of Vice Chancellors and Principals (of UK universities) (CVCP), will develop a 'national body' which will seek to formalise accreditation systems while allowing for local variation.

For certain courses, the current lack of external recognition may have considerably detrimental results. For instance, from the built environment course, it is theoretically possible to gain access to the B.Eng. in civil engineering (though as yet all exits have been to the HND). Such an entrant to this degree would, under the Joint Board of Moderator rules of the Institute of Civil Engineering (ICE), be disadvantaged by the Chilver points system because they would lack the points normally accumulated from GCE 'O' and 'A' levels onwards. At present Access qualifications are not accepted as suitable alternatives by the Institute.

* Additionally, at Stannington, the envisaged Access programme will be co-ordinated with a conversion course under the selective initiative of the National Advisory Body (NAB) for public sector higher education.

9. CONCLUSIONS AND RECOMMENDATIONS

FE/HE collaboration

Conclusions

Science Access courses seek to relate the learning needs of mature students to a science and maths content which lies somewhere along a continuum of that found in the syllabuses of standard entry qualifications and that agreed by HE staff as a necessary minimum pre-requisite for entry to exit courses. Although there is necessarily some common ground between these poles, the latter is likely to be less content-laden, and related to the needs of HE exit courses. A programme designed on this basis requires very close initial collaboration between FE and HE and an ongoing curriculum review, utilising the experiences of students who have entered HE.

In some cases, good working relationships between FE and HE evidently exist; in others a number of FE staff expressed a feeling that the HE institutions' contribution was insufficient and unsatisfactory.

Recommendations

- The Access science curriculum should be developed co-operatively by FE and HE staff and should equip students with the skills and knowledge to progress to and succeed on specified HE courses.
- Formal mechanisms should be set up in HE to review the progress of students entering via Access routes, in relation to those entering by standard routes.
- Joint course boards of FE and HE staff should have responsibility for reviewing and developing the Access curriculum; this process should be informed by feedback from Access students and Access entrants in HE.

Content and skills

Conclusions

A great deal of similarity exists in the programmes of many disciplines within science Access courses and considerable information is available as to the efficacy of various approaches. It may be possible to devise a 'common core' of content with a national currency to include a compulsory maths input at a level similar to that now existing at South London and Vauxhall. An integrated input of communications and study skills would also be mandatory, though further curriculum development is necessary in this area.

According to the nature and demands of the exit courses, two subjects from maths, physics, chemistry and biology might be studied in depth. During the first term introductions might be given to each science, prior to specialisation in the second and third terms. A number of courses have already distinguished between the 'essential' and 'desirable' elements of knowledge content and the conclusions might form a useful starting point for others.

Despite the obvious selectivity of content in most Access programmes, all courses tend to be heavily content based. More rationalisation of content by the integration of the sciences and maths is vital. Except where students are being prepared specifically for maths degrees, maths can be effectively taught within the context of the sciences. Examples of effective strategies for integration are included in the project.

Study skills are included either as a separate timetabled subject or as a part of other specific subjects. A majority of students felt satisfied with their preparation with regard to most skills and probably have an advantage over other entrants to HE in this respect; but certain areas need attention, particularly examination skills, essay writing and seminar presentation. It is evident that study skills, in many cases, are the province of staff without science expertise. Students appear to be alienated from study skills, partly because of its apparent lack of relevance and partly because of the lack of appropriate science study skills materials.

Recommendations

- Staff designing curricula for science Access courses should seek to rationalise content by integrating elements common to a number of disciplines.

- Learning strategies that emphasise the common aspects of different subjects should be employed. Such methods require small and closely knit course teams meeting regularly and frequently.

- Maths and study skills should be taught wherever practicable within the context of science. In-service training of maths and science and/or communications lecturers may be necessary to ensure the relevance of the study skills content of the course.

- Examples of good practice in integrating maths and study skills should be disseminated and relevant materials collected and distributed. This work could be undertaken by the Forum for Access Studies.

Student selection and assessment

Conclusions

The concept of 'Open Access' without selection assessment, in maths and written communications, appears impracticable and undesirable for the courses that have been studied. However, a system of 'all through provision' whereby adult students can progress to the Access level is desirable and is a feature of certain case studies. For most courses, selection tests in maths aim to determine competence in arithmetic operations on the basis of previous knowledge. The relationship between performance in such tests and ultimate performance in the Access course appears not to have been established.[1] Tests designed to determine maths potential are used for entry to one course and perhaps deserve greater scrutiny.[2]

- A small-scale investigation by Steve Lockett, Access course tutor at Woolwich College, found little relationship between initial test scores and ultimate performance in the Access course.

- The Access to science course at Kingsway-Princeton College gives applicants a structured learning pack on a particular maths topic, with a specimen test. Applicants follow the programme of the pack and return to take a similar test, a strategy which may be of particular interest to Access staff elsewhere.

Recommendations

- Selection methods should aim to identify any personal and domestic difficulties that may mediate against success in Access courses and applicants should be advised as to support systems available and measures which can be taken prior to involvement.

- Selection should involve a demonstration of basic competency in maths and communications.

- Further research is required in determining the diagnostic efficacy of entrance tests and their effectiveness in measuring potential rather than acquired knowledge.

- Pre-Access routes should be made available for those who cannot immediately cope with the academic rigour of an Access course.

Teaching strategies

Conclusions

Although there is no universal 'Access style' of teaching, strategies tend to be student-centred, individual needs are considered, and co-operative

learning methods encouraged. Most case-study staff were aware of the special learning needs of adults, but it was evident that some had given little consideration to this.

Additional drop-in workshops where individual attention can be given were provided on a number of courses, offering very useful back-up to other inputs.

Distance-learning materials can play a key role for students who suffer considerable financial and domestic difficulties during the Access year and beyond. Very little of such material appears to exist.

Regular counselling and guidance are an important feature of Access courses and 89% of students were satisfied with their tutorial support. This aspect of the Access course is particularly important where students are making financial and personal sacrifices to return to education. Of the students, 36% had had financial, domestic or health problems during the course, and 32% had difficulties caused by the greater quantity of work demanded of them than they had anticipated.

There was an overwhelming feeling in HE that students coming from the Access route should not be treated differently from other entrants. From the reactions of some students to their transition to HE, it appeared that they had not been adequately prepared by the Access course for the change in style and volume of work. Closer liaison through student visits to the linked HE institution, teaching input by HE staff during the Access year, and integration of HE staff within the Access course team are facets of some courses and may aid transition.

Although it is not the primary aim of Access courses to change the delivery methods of HE, it may be that as increasing numbers of adults enter HE, traditional modes of teaching may be challenged. The collaboration between FE and HE staff in Access developments can lead to useful interchanges of pedagogical expertise.

Recommendations

- In-service training should be made available to both FE and HE staff in order that they might consider the special features associated with teaching adult students and the learning strategies that may be employed.

- Distance-learning materials, including CAL, particularly designed for Access students, should be developed in maths, science and technology

and marketed, perhaps in collaboration with the Open College of the Air.

- Drop-in workshops in maths, science subjects and communications are desirable components of all courses and should be considered by all institutions offering or planning courses.

- The availability of laboratories, workshops and computer facilities in HE to Access students should be improved.

Assessment

Conclusions

Assessment methods in many courses are weighted towards the assessment procedures of HE; unseen papers, in general, contribute to 40–60% of overall marks. In many subjects there is considerable debate as to whether these examinations in themselves should be used only as a study skill. However, feedback from students indicates that substantial numbers feel ill-prepared for taking examinations and this is particularly evident in courses where little formal assessment was utilised.

The conscious use of a variety of different assessment methods in different disciplines appeared to be a successful compromise. The use of unseen tests or examinations exclusively in a one-year course would seem unnecessarily stressful for students who have recently returned to study. Conversely, the lack of such assessment methods is unrealistic, given that most HE courses in maths, science and technology give examinations a 70% weighting. The compromise of assessing via practical assignments and project work as well as formal testing has the added advantage of providing a vehicle for developing skills and integrating skills and knowledge.

The learning aspects of assessment appear to have been considered in detail in only one course, at Vauxhall. Such a system, where students are continually encouraged to assess themselves and identify and present evidence of their skills and knowledge acquisition, enables them to take an active role in their learning and allows very regular diagnosis and treatment of learning difficulties.

Recommendations

- Assessment methods on Access courses should include those employed on HE exit courses.

- While formal examinations may be deemed necessary, other modes of assessment that reflect the development of practical and study skills should be included.

- The learning aspects of assessment methods should be fully utilised.

Validation

Conclusions

The recent White Paper has indicated that 'the responsibilities of validating bodies extend . . . to Access provision in all styles' and has invited them 'to give attention, in consultation with the providers, to developing a comprehensive framework within which the availability of well-devised Access courses can be increased'[24].

Moves towards the creation of validation procedures by national bodies could have negative side-effects and should be approached with caution. Such mechanisms could create new barriers for mature students to overcome if they prescribe content and assessment procedures.

The acceptance of an Access course by an HE institution as a standard mode of entry, together with 'recognition' of the arrangement by the CNAA, may be sufficient to ensure transferability of the qualification. Concern regarding the quality of provision may be overcome by regular internal review by HE institutions and the inclusion of the linked Access course in any external validations and resubmissions of the receiving HE course.

Recommendations

- Joint course boards should appoint external moderators for Access courses.

- Access courses should be the subject of joint validation and regular review procedures.

- Any validation procedures with a national currency should be designed with the aim of widening Access rather than increasing barriers.

Progression

Conclusions

Overall, six out of ten Access students in maths, science and technology progress to HE. For those who do not progress, non-completion is almost twice as likely as failure. It would appear that direct-linked, multi-exit Access courses with options at degree and HND level input provide the best overall progression figures.

It is clear from the comments of Access course tutors that non-completion is commonly associated with personal and domestic difficulties rather than

with academic problems. Considerable personal tutorial support and suitable counselling is clearly necessary in such cases. Where consistently high drop-out rates exist, selection and delivery methods must be reviewed carefully and pre-Access routes developed. The lowest progression rates, which were at Mid-Warwickshire, may be attributed to a number of causes. The practice of encouraging Access students to take an 'A' level and 'O' levels probably devalues the parallel Access assessments, despite their greater appropriateness for adults returning to study and their recognition by Lancaster Polytechnic for entry to the modular degree course. The emphasis on GCE qualifications may be related to the clear preference for an 'A' level that is expressed by Warwick University for entry to their B.Ed. science degree. Furthermore, the absence of a fixed link with guaranteed places is likely to discourage students from relying on such a progression route.

In general, the existence of a fixed link with guaranteed places would appear to have few disadvantages. It does not hamper progression to non-linked institutions; in fact, its existence may 'validate' the Access course in the eyes of other HE courses.

For courses where there have been a rapid expansion of numbers, progression rates have dramatically decreased. It may be that the positive features of Access arrangements, such as closely knit course teams, are dissipated by too-rapid expansion as expertise is spread more thinly.

Recommendations

- Access courses should establish fixed links with specific HE courses.
- Access students should not be encouraged to take GCSE examinations during the Access year.
- Access courses should be recognised as a standard rather than non-standard route to HE.

HE performance

Conclusions

Any answers to the crucial question as to whether Access students are succeeding in HE courses in maths, science and technology must be qualified by the limited data available, given the relatively small number of Access entrants so far. The range for the success rate of individual courses, 56–78%, cannot be usefully compared with that for students entering through other modes since DES statistics relate only to students who complete final exams. The Davies and Yates report[12] found that, of a sample

of 69 students in technology, engineering and science subjects, 44.9% were progressing successfully.

It would appear that lack of success in HE is largely due to non-completion rather than failure and may indicate a need to review academic and personal counselling systems in HE.

It appears that the lower success rates are found where courses have relatively 'weak' links with their HE exit courses. In the case of South Bank Polytechnic's link with Vauxhall and City of London Polytechnic's link with Southwark, it would appear that there is very little contribution of any kind from the polytechnic during the Access year.

Furthermore, the lower success rates for Access entrants appear to be associated with HE courses that have relatively low overall success rates for all students.

The considerably greater success rate of students progressing from Southwark to non-linked institutions (82%) rather than to CLP (45%) raises a number of issues. The data certainly demonstrates that the existence of a fixed link does not damage students' prospects of success in progressing to a non-linked institution.

Recommendations

- Further and ongoing monitoring of the progress of students from all types of entry into maths, science and engineering courses is necessary and should be initiated by the DES. The Bedford College of HE/Forum for Access Studies (FAST) database project for Access studies funded by the CNAA may provide a basis for such monitoring.

- HE support services should be reviewed to ensure that they provide back-up appropriate for mature students.

- There is need for a review of the responses of the HE curriculum to changes in the nature of the student body.

Targeting and student support

Conclusions

Access courses in maths, science and technology provide a unique opportunity for unqualified adults to progress to HE. Data from the seven case studies indicates that considerable numbers of Access students are from Black or ethnic minority groups (48%), women (42%) or unemployed (50%)[1]. Hence a route is being provided for students who are traditionally

under-represented in HE courses in maths, science and technology. This route provides a positive direction for the unemployed to progress into fields in which the nation demands more skilled and trained people.

Only a few LEAs, in particular the ILEA, have supported developments in this field to the extent of setting up full-time courses and providing discretionary awards. The undertaking of any Access course, for the majority of students, is a difficult task; in maths, science and technology it is perhaps more so than in other disciplines. However, for a majority of students it is a successful enterprise not made easier by the financial barriers that unemployed students may have to overcome.

Recommendations

- Access courses should be targeted towards students who have traditionally been under-represented in the fields of maths, science and technology.

- The Department of Employment and LEAs should actively encourage and financially support the adult unemployed in undertaking Access courses in these areas of skills shortage.

- The DES should consider recognising some Access courses as being suitable for the allocation of mandatory awards.

APPENDICES

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I. Project Personnel

Project Team

Project Director Maggie Woodrow, Head of Access Studies, South Bank Polytechnic.

Project Workers Dr Michael Osborne on 0.25 secondment from South London College, January 1986 – April 1987.
Dr Kay Singleton on 0.25 secondment from Southwark College, January 1986 – July 1986.

Clerical/Administrative Assistant Sandy Carter on 0.5 secondment, January 1986 – April 1987.

Steering Group Membership

Albert Clyde	FEU
Pat Davies	Centre for Access Studies. Roehampton Institute of HE
Dr B Furniss	ILEA Inspectorate
Dr S Singh	ILEA Inspectorate
Ken Millins	Roehampton Institute of HE
Alan Murray	FEU
Dr B Taylor	Polytechnic of North London
Gareth Parry	The City University
Sandy Carter	Project Team
Dr M Osborne	Project Team
Dr K Singleton	Project Team
Maggie Woodrow	Project Team – Chair

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Address

2 Orange Street, London WC2H 7WE Telephone: 01-321 0433